FOOD SCIENCE AND QUALITY CONTROL
SYLLABUS FOR B.Sc.

CHOICE BASED CREDIT SYSTEM (CBCS)

To be commenced from the Academic year 2025-26

KAKATIYA UNIVERSITY
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CREDIT DISTRIBUTION FOR THE COURSE

Annexure-I (Credits)

Proposed CBCS Structure from 2025-2026 for Undergraduate Course

Courses		Papers	Total Credits	Credits for each paper/ Semester					
				B.Sc					
				I	II	III	IV	V	VI
Core Courses (DSC)	Major-1	6	30	5	5	5	5	5	5
	Major-2	6	30	5	5	5	5	5	5
	Minor-1	4	20	5	5	5	5	---	----
MIL/AEC (First language)	English	4	20	5	5	5	5	---	----
Second Language (Telugu, Hindi, Urdu etc.,)		4	20	5	5	5	5	---	----
Multi Disciplinary Course	MDC-1	1	4	---	----	---	----	4	----
SEC 1,2		2	4	---	----	---	----	2	2
SEC 3,4		2	4	---	----	---	----	2	2
Value added course (VAC)	VAC 1,2	2	6	---	----	---	----	3	3
Internships	Internship/Project	1	4	---	----	---	----	---	4
Total Credits in each semester		----	142	25	25	25	25	21	21
Total Credits in UG		---	142						

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CURRICULUM FOR FOOD SCIENCE AND QUALITY CONTROL FOR B.Sc. (UG) 2025-26

YEAR	Semester	Course Title (Theory and Practical)	HPW	Number of Credits	Total Credits	Max. Marks		
						I.A	End Exam	Total
1st Year	I Sem	Paper-1: Food Chemistry & Nutrition (Theory)	4	4	5	20	80	100
		Food Chemistry & Nutrition (Practical)	2	1		-	25	25
	II Sem	Paper-II: Food Microbiology, Sanitation and Hygiene (Theory)	4	4	5	20	80	100
		Food Microbiology, Sanitation and Hygiene (Practical)	2	1		-	25	25
2nd Year	III Sem	Paper-III: Post Harvest Technology of Field Crops (Theory)	4	4	5	20	80	100
		Post Harvest Technology of Field Crops (Practical)	2	1		-	25	25
	IV Sem	Paper-IV: Technology of Animal Foods (Theory)	4	4	5	20	80	100
		Technology of Animal Foods (Practical)	2	1		-	25	25
3rd Year	V Sem	Paper-V: Technology of Fermented Foods and Beverages (Theory)	4	4	5	20	80	100
		Technology of Fermented Foods and Beverages (Practical)	2	1		-	25	25
		MDC-1	4	4	4	20	80	100
		SEC-1	2	2	2	10	40	50
		SEC-2:	2	2	2	10	40	50
		VAC-1:	3	3	3	15	60	75
	VI Sem	Paper-VI: Food Safety, Quality Control and Sensory Evaluation (Theory)	4	4	5	20	80	100
		Food Safety, Quality Control and Sensory Evaluation (Practical)	2	1		-	25	25
		SEC-3	2	2	2	10	40	50
		SEC-4	2	2	2	10	40	50
		VAC-2	3	3	3	15	60	75
		Internship / Project	4	4	4	20	80	100
		TOTAL	**58**	**52**	**52**	**230**	**1070**	**1300**

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Sl.No	Paper	Credits
1	Major - 1	30
2	Major -2	30
3	Minor - 1	20
4	AEC (Ability Enhancement Course) - English	20
5	Second Language	20
6	MDC (Multi-Disciplinary Course) - 1	4
7	SEC (Skill Enhancement Course) – 1,2,3,4	8
8	VAC (Value Added Course) -1,2	6
9	Project	4
	TOTAL	**142**

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I YEAR - SEMESTER – I
KAKATIYA UNIVERSITY – WARANGAL - TELANGANA
Under Graduate Courses (Under CBCS 2025-26 onwards)

PAPER-I: Food Chemistry & Nutrition

UNIT – I

1. Introduction to nutrition – definition of nutrition, Food as a source of nutrients. Functions of foods
2. Inter relationship between nutrition and health, visible symptoms of good health.
3. Food guide-basic five food groups and usage of food guide.
4. Use of food in body-digestion, absorption, transport, utilization of nutrients in the body.

UNIT – II

1. Carbohydrates- composition, classification, sources, functions, structure, physical & chemical properties.
2. Lipids – classification, composition, nomenclature, saturated& unsaturated fatty acids, food sources, functions of fats.
3. Proteins – composition, classification, sources, functions, denaturation, and protein deficiency, determination of protein quality.
4. Amino acids – classification, Physio-chemical properties, modification of food protein through processing and storage.

UNIT – III

1. Water as a nutrient, function, sources, requirement, structure and water balance – effect of deficiency.
2. Moisture in food: Hydrogen bonding, Bound water, free water, Water activity and Food stability.
3. Energy – Unit of energy, food as a source of energy, energy value of food, the body's need for energy, energy requirement for different age groups. B.M.R. activities
4. Enzymes. Nomenclature, specificity, uses of enzymes in foods, enzyme added to food during processing

UNIT – IV

1. Mineral functions, sources, Bio-availability, and deficiency of following minerals – calcium, Iron, Iodine, Fluorine, sodium, potassium.
2. Vitamins – Classification, units of measurement, sources, functions and deficiency diseases caused by following vitamins:
3. Pigments indigenous to food, structure, chemical and physical properties. Effect of processing and storage.
4. Flavours – Vegetables, fruit and spice flavours, fermented food, Meat and sea food.

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Semester-I Practical syllabus
Paper – I: Food Chemistry & Nutrition

1. Experiments on properties of monosaccharides- Glucose, Fructose and Galactose
2. Experiments on properties of Disaccharides - maltose, lactose and sucrose.
3. Experiments on properties of Polysaccharides -starch
4. Estimation of glucose in a given sample.
5. Experiments on properties of amino-acids.
6. Experiments on properties of proteins
7. Experiments on properties of fats.
8. Saponification number of lipids.
9. Determination of T S S
10. Determination of Ash content

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I YEAR - SEMESTER – II
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Under Graduate Courses (Under CBCS 2025-26 onwards)

PAPER-II: Food Microbiology, Sanitation and Hygiene

UNIT – I

- Introduction to microbiology and its relevance to everyday life-General morphology of micro-organisms – General characteristics of bacteria, fungi, virus, protozoa, algae.
- Control of micro-organisms, growth curve – Effect of environmental factors on growth of microorganisms-pH, water activity – oxygen availability, temperature & others.
- The relationship of micro-organism to sanitation. Role of microbiology-Environment effects of microbial growth.

UNIT – II

- Effects of micro-organisms on food degradation and food bore illness – Bacteria, Virus, Molds, Yeasts and parasites (food poisoning).
- Other food hazards – chemicals, antibiotics, hormones, metals contamination – poisonous foods.
- Other agents of contamination: Human, domestic animals, vermins, birds.
- Beneficial effect of micro-organisms.

UNIT – III

1. Microbiology of different foods – Spoilage and contamination- Sources, types, effects on the following:
   a) Cereals & Cereals products.
   b) Vegetables & Fruits.
   c) Meat & Meat products.
   d) Eggs & Poultry.
   e) Milk & Milk products.

UNIT – IV

- Importance of personal hygiene of food handlers – clothes, illness. Education of food handler in handling and serving food
- Safety in food procurement,' storage, handling and preparation – control of spoilage – safety of left over foods.
- Cleaning and sanitization. Products and methods – use of detergents and chemicals Planning and implementation of training programmes for health personnel.
- Relevance of microbiological standards for food safety.

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Semester II practical syllabus
Paper – II: Food Microbiology, Sanitation and Hygiene

1. Microscope and its parts. Examination under low power/high power and oil immersion objectives.
2. Gram staining, Isolation and Identification.
3. Ziehl-Neelsen staining.
4. Examination of yeasts, mould and non-pathogenic bacteria.
5. Study of sterilization equipments.
6. On the job training for 1 month during summer break.

REFERENCES:

1. Adams, M.R and Mass, M.D. (2008). Food Microbiology. newAge International Pvt. Ltd. Publishers.
2. Banwart, G.T. (1987). Basic Food Microbiology. CBS Publications:New Delhi.
3. Block, J.G. (1999). Microbiology Principles and Explorations. 4th Edition. John Wiley and sons Inc.
4. Frazier, W.C. (1968). Food Microbiology. 4th Edition. McGraw Hill Inc.
5. Jay, J.M., Lossner, M.J and Golden, D.A. (2008). Modern Food Microbiology. 7th edition. Springer. ISBN: 0387231803
6. Kawata, J.G. (1963). Environment Sanitation in India. Lucknow Publishing House.
7. Longree, K. (1967). Quality Food Sanitation. McGraw Hill Publishers: New York.
8. Pelezar, H.J. and Rober, D. (1968). Microbiology. 2nd Edition. McGraw Hill: New York.

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II YEAR - SEMESTER – III
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Under Graduate Courses (Under CBCS 2025-26 onwards)
PAPER-III: **Post-harvest technology of field crops**

UNIT I Vegetables

Composition, Classification, Nutritive Value, Changes during cooking, storage, factors affecting storage and post-harvest losses. Canning and blanching of fruits and vegetables Preparation and preservation of seasonal pickles, tomato ketchup and chutneys.

Fruits

Composition, Classification, Nutritive Value, Post harvest Changes and Storage, ripening of fruits, enzymatic browning. Processing and preservation of fruit products- jam, jelly, marmalade, nectar, cordial, squashes.

UNIT II: CEREALS AND MILLETS

Rice-Types, structure, chemical composition, Nutritive Value, milling-parboiling, ageing, processed food products of rice.

Wheat-Types, structure, composition, Nutritive value, milling of wheat, milling types, milling of wheat in to different types of flours, processed wheat products.

Millets- Ragi, Jowar, Bajra- structure, chemical composition, processed millet products and health benefits.

UNIT III: PULSES & LEGUMES

Composition, Nutritive Value, Processing of Pulses and Legumes-milling of pulses by traditional and commercial methods-dry milling of pulses, milling of pulses by CFTRI method.

Toxic constituents of pulses -Trypsin Inhibitors, Lathyrogens, Favism, Haemagglutinins, Cyanogenic Glycoside, Saponins and Goitrogens. Methods to eliminate toxic constituents.

UNIT IV: NUTS & OILSEEDS

Nuts & Oilseeds – Composition and Nutritive Value, Processing of groundnut & sunflower seeds in to edible oils, Hydrogenation of oils, Rancidity of Oils- Definition, Types and prevention. Anti-oxidants used to extend shelf life of oils, adulteration of different oils and methods used to determine adulteration

REFERENCES

1. Bennion, M and Scheule, B. (2014). Introductory Foods. Pearson education.
2. Manay, N.S and Shadaksharaswamy, M. (2001). Food Facts and Principles. New Age International Publishers.
3. Srilakshmi, B. (2007). Food Science. NewAge International.
4. Subbulakshmi, G. (2001). Food Science and Preservation. New Age International (P) Ltd.

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Semester III Practical syllabus
Paper – III: Post-harvest technology of field crops

1. Preservation of fruits and vegetables by following methods:
   a. Canning
   b. Squash/Jam/Nectar
   c. Pickles
   d. Drying
2. To process and preserve fruit and vegetable-based products
3. To observe processing of cereals, oils at various food manufacturing Units
4. Simple physical and chemical tests to be determine quality and detect adulterants in the following:
   i. Oil and Fats
   ii. Spices and Condiments (any five)
   iii. Food Grains, Pulses and Oilseeds,
   iv. Flours – Wheat
   v. Canned foods
   vi. Sugar and Honey
   vii. Milk & Milk

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II YEAR - SEMESTER – IV
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Under Graduate Courses (Under CBCS 2025-26 onwards)

PAPER-IV: **Technology of Animal Foods**

Unit-I

Definition of milk- composition, sources of milk, types of cow and buffalo varieties for high yielding of milk and nutritive value of milk-physical and chemical properties of milk. Processing of milk: Receiving of milk, Platform tests, filtration and clarification, standardization – Pasteurisation Methods - Sterilisation methods, Homogenisation, packaging and distribution of milk. Types of milk. Milk production as an entrepreneurship activity-government schemes.

Unit-II

Processing of milk in to different milk products-Cream, butter, ghee, cheese-types. Fermented milk products.
Manufacturing of Ice-cream- Definition, classification, composition, ingredients used, colours and flavours used, defects and over-run in ice-cream.
Manufacturing of indigenous milk products-Khoa, kalakhand, paneer, rasogolla, channa.

Unit III

Meat industry in India-sources of meat-composition, nutritive value and microscopic structure of meat- stunning and slaughtering methods -Post mortem changes in meat-meat preservation methods and packaging of meat
Classification of poultry meat; Composition and nutritional value of poultry meat; Processing of poultry meat; By-product utilization. Structure, composition and nutritive value of egg.

Unit-IV

Fish industry and production in India. Classification of fresh water fish and marine fish; Commercial handling, storage and transport of raw fish; Average c o m p o s i t i o n of fish; Freshness criteria a n d quality assessment of fish; Spoilage of Fish; Methods of Preservation of fish: Canning, Freezing, Drying, Salting, Smoking and Curing. Fish products and shrimp processing

Course Outcome:

- Student will be able to understand the importance of meat, preservation and processing into different products

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Semester IV Practical syllabus
Paper – IV: Technology of Animal Foods

1) Study on basics of reception of milk at the plant;
2) platform tests in milk;
3) estimation and fat and SNF in milk;
4) Operation of LTLT & HTST
5) Pasteurization; Preparation of special milks;
6) Cream separation & standardization of milk;
7) Preparation and evaluation of table butter, ice cream, cheese and indigenous milk product such as khoa, chhana, paneer, ghee, rasogulla, gulab jamun, shrikhand, lassi, burfi etc.; Visit to dairy plants.

Suggested Readings:

- Aneja RP, Mathur BN, Chandan RC & Banerjee AK. 2002. Technology of Indian Milk Products. Dairy India Publ.
- De Sukumar,1980. Outlines of Dairy Technology. Oxford Univ. Press.
- Rathore NS et al. 2008. Fundamentals of Dairy Technology - Theory &Practices. Himanshu Publ
- Web BH, Johnson AH & Lford JA. 1987. Fundamental of Dairy Chemistry. 3rd Ed. AVI Publ.
- Spreer E. 1993. Milk and Dairy Products. Marcel Dekker.

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III YEAR - SEMESTER – V
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Under Graduate Courses (Under CBCS 2025-26 onwards)

PAPER-V: **Technology of Fermented Foods and Beverages**

UNIT-I

Fermented foods:

- Introduction to fermentation-types of fermentation, benefits of fermentation.
- Production of sauerkraut: Preparation of traditional pickles-fermentation of pickles and microbiology involved in preservation of pickles.
- Traditional fermented foods like Idli, Dosa - Manufacturing process and microorganisms involved in fermentation, importance of nutritive value as a breakfast food.

UNIT-II

Beverages:

- Introduction and classification of beverages; Growth of beverage industry in India; Ingredients used in beverages
- Water- Introduction, Sources, types of water, different methods of purification of water, BIS standards for packaged drinking water.
- Additives used in beverages- colours, flavours, sweetners and preservatives.

UNIT-III

- Fruit based beverages – manufacturing process and preservation of Nectar, Cordial, Squash.
- Carbonated beverages- Soft drinks-manufacturing process, role of ingredients used in soft drinks, leading companies in the world and their products
- Low calorie beverages, sports drinks.
- Tea and coffee processing- manufacturing process and different types of tea and coffee beverages.

UNIT-IV

Alcoholic beverages:

- Introduction to alcoholic beverages, types, role of ingredients used in alcoholic beverages.
- Wine- - Ingredients used types of wine, manufacturing process of wine, fermentation and preservation of wine, uses and demerits of wine on consumption as an alcoholic beverage.
- Beer-Ingredients used types of beer, manufacturing process and role of yeast in fermentation of beer, packaging of beer.
- Distilled beverages: Rum, brandy and whisky.

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Semester V: Practical syllabus

1. Preparation of yoghurt
2. Preparation of buttermilk
3. Preparation of whey based fermented beverages
4. Preparation of pickles
5. Preparation of wine
6. Production of sauerkraut
7. Preparation of fruit beverages
8. Preparation of carbonated soft drinks
9. Preparation of non carbonated and non alcoholic beverages
10. Visit to beverage industry

SUGGESTED READINGS:

- Ravinder, A. Srinivas Maloo and Dr. Emmanuel, S.J. 2013. Hand Book of Fermented foods and Beverages, 1st edition. Mumbai: Himalaya Books Publishing House.
- Priest, F.G. and Stewart, G.G. 2006. Handbook of Brewing. 2nd edition. New Delhi: CRC Publication.
- Richard, P. 1981. Commercial Wine Making - Processing and Controls. New Delhi: AVI Publication.
- Prescott, S.C. and Dunn, C.G. 1959. Industrial Microbiology. 6th edition. New Delhi: Tata McGraw Hill.
- Varnam, A.H. and Sutherland, J.P. 1994. Beverages: Technology, Chemistry and Microbiology. Scotland: Chapman & Hall.
- Woodroof, J.G. and Phillips, G.F.1974. Beverages: Carbonated and Non-Carbonated. New Delhi: AVI Publication.

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III YEAR - SEMESTER – VI
KAKATIYA UNIVERSITY – WARANGAL - TELANGANA
Under Graduate Courses (Under CBCS 2025-26 onwards)

PAPER-VI: **Food Safety, Quality Control and Sensory Evaluation**

UNIT-1

Food safety: Characterization and risk analysis- Food hazards: Physical, Chemical and biological systems for food safety. Hazard Analysis Critical Control Point (HACCP) and its implementation.

UNIT-II

Quality Assurance: Theoretical and practical considerations, description of different systems: GAP, GMP, TQM, ISO. Indian food standards- Voluntary and Obligatory standards (PFA, FPO, MMPO, AGMARK etc.) Codex alimentarius, Worldwide food safety issues.

UNIT-III

Sensory evaluation: Requirements and methods. Sensory parameters: Colour, flavour, texture, taste, aroma, general acceptability. Subjective and Objective test of sensory parameters. (Differential test, Descriptive test, Rating test, Sensitivity threshold test).

UNIT –IV

Clean In Place (CIP)- Different sanitizers and detergents- Sanitation and hygiene in quality assurance in different food industries (Fruits and vegetables, Meat, Milk, Cereal Based).Cost of Quality, Supplier development.

Course Outcomes:

Upon completion of this course, the student will be able to understand the principles and methods of Quality Control and Assurance in foods, understand the principles of sensory evaluation, understand the principles of HACCP in different food processing. (Skills) carry out sensory evaluation of a newly developed product, identify hazards and critical control points of different existing production processes.

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III YEAR - SEMESTER – VI
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Under Graduate Courses (Under CBCS 2025-26 onwards)

PAPER-VI: **Food Safety, Quality Control and Sensory Evaluation**

PRACTICAL SYLLABUS

1. Detection of physical, chemical, and biological hazards in food samples
2. Development and documentation of a HACCP plan for a selected food product
3. Evaluation of food samples against Indian standards like PFA, FPO, AGMARK
4. Conducting descriptive and differential sensory tests using trained panelists
5. Objective measurement of sensory parameters using instruments
6. Hygiene audit and sanitizer effectiveness testing in food processing setups
7. Simulation of Clean-In-Place (CIP) procedures and assessment of cleaning efficiency
8. Preparation of documentation for GMP, TQM, and ISO quality systems
9. Cost of quality analysis including prevention, appraisal, and failure costs
10. Sensory threshold testing for salt, sugar, and acid in food samples

References:

- Amerine MA, Pangborn RM & Rosslos EB. 1965. Principles of Sensory Evaluation of Food. Academic Press.
- Early R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.
- Furia TE.1980. Regulatory status of Direct Food Additives. CRC Press.
- Jellinek G. 1985. Sensory Evaluation of Food - Theory and Practice. Ellis Horwoood.
- Krammer A & Twigg BA.1973. Quality Control in Food Industry. Vol. I, II. AVI Publ.
- Macrae R, Roloson R & Sadlu MJ. 1994. Encyclopedia of Food Science & Technology & Nutrition. Vol. XVI. Academic Press.
- Piggot J.R. 1984. Sensory Evaluation of Foods. Elbview Applied Science.
- Ranganna S. 2001. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. 2nd Ed. Tata-McGraw-Hill.
- Export/Import policy by Govt. of India.

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Annexure – I (Credits)
Proposed CBCS Structure from 2025-26 for Under Graduate Courses

Courses		Papers	Total Credits	Credits for each paper / Semester						Credits for each paper / Semester						Credits for each paper / Semester					
				BA						B.Com.						B.Sc.					
				I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Core Courses DSC	Major-1	6	30	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Major -2	6	30	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Minor-1	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
MIL/AEC (First Language)	English	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
Second Language (Telugu, Hindi, Urdu, etc.)		4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
Multi-Disciplinary Course	MDC 1	1	4	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4	-
Sec 1, 2		2	4					2	2					2	2					2	2
Sec 3, 4		2	4					2	2					2	2					2	2
Value added course (VAC)	VAC 1, 2	2	6	-	-	-	-	3	3	-	-	-	-	3	3	-	-	-	-	3	3
Internships	Internship / Project	1	4	-	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4
Total Credits in each semester			142	25	25	25	25	21	21	25	25	25	25	21	21	25	25	25	25	21	21
Total Credits in UG				142						142						142					
Credits under Non-CGPA (Community engagement and service)		NSS /NCC /sports / Extra curricular	6	Upto 6 (2 in each year)						Upto 6 (2 in each year)						Upto 6 (2 in each year)					
		IKS	4	Upto 4 (2 in each, after I & II years)						Upto 4 (2 in each, after I & II years)						Upto 4 (2 in each, after I & II years)					